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GEOGRAPHICAL RECORD

AMERICAN GEOGRAPHICAL SOCIETY

Meetings of February. An inter-monthly meeting of the American Geographical Society was held on Tuesday evening, February 11, at the Engineering Societies' Building, 29 West Thirty-ninth Street. President Greenough presided. The lecturer of the evening was Mr. Henry Woodhouse of the Aero Club of America; he addressed the Society on ''The Trail of the Airplane.'' The lecture dealt with the function of the airplane in exploration and in commerce as well as in war and was illustrated by motion pictures of exceptional merit. In addition to the article on the use of the airplane in exploration in the present number of the *Geographical Review,* Mr. Woodhouse contributed an article on aërial transportation, it will be recalled, over a year ago (Aëronautical Maps and Aërial Transportation, Vol. 4, 1917, pp. 329-350).

A monthly meeting of the Society was held on February 25. President Greenough presided. He submitted the names of 13 candidates for Fellowship, each of whom had been approved by the Council, and they were confirmed as Fellows of the Society. Thereupon Dr. Alfred G. Mayor, director of the Department of Marine Biology of the Carnegie Institution, addressed the Society on ''The South Sea Islands.'' In his lecture he drew upon the experiences of his various zoölogical trips to the Pacific—to the Fiji Islands in 1897, on the *Albatross* in 1899-1900, to Torres Straits and New Guinea in 1913, and to Samoa in 1917.

NORTH AMERICA

The War Work of the United States Geological Survey. Summaries of the services rendered by science in the conduct of the war (see G. K. Burgess: Application of Science to Warfare in France, *Scientific Monthly,* October, 1917, pp. 289-297, and J. S. Ames: Science at the Front, *Atlantic Monthly,* January, 1918, pp. 90-100), make it evident that of all branches few have been of greater importance than the so-called earth sciences. While it is an every-day observation that geography has come into its own more fully than ever before, it is clear, too, that geology, also, has demonstrated its practical utility in a new and striking manner. In a series of ''discussions'' appearing in *Economic Geology* (March, 1918, pp. 145-146; June, 1918, pp. 314-315; and July, 1918, pp. 392-399) the important co-operation of the United States Geological Survey in government war work is dealt with. A note in the *Geographical Review* (Vol. 5, 1918, p. 73) has already called attention to some phases of this contribution, but the Thirty-Ninth Annual Report (for the fiscal year ended June 30, 1918) of the Survey itself, recently issued (163 pp.; Washington, D. C., 1918), contains a comprehensive statement of the signally valuable service rendered.

Immediately upon this country's entry into the conflict each branch of the organization directed its activities, so far as possible, to assisting in the prosecution of the war. The list of their multitudinous achievements makes a notable record. The Geological Branch began an exhaustive investigation into the mineral resources of the nation, instituting a painstaking search for new deposits, particularly of those materials needed to supply military demands. This search was not limited to the territory of the United States, but was carried on in other parts of the continent and the West Indies from which essential minerals might be obtained. To supplement this work a compilation of statistics regarding the mineral resources of the world was undertaken. The results of these researches have been partially published, in the press and in the various monographs issued by the Survey during the year. In addition to their importance as war work, they will form, when completed, a valuable contribution to pure science.

In order to ascertain the extent to which electricity might be substituted for coal and other fuels, the Water Supply Branch instituted a country-wide survey of the water power available. This survey is still going on. Its completion should mark a most notable advance toward the development of the hydro-electric resources of the nation, bringing the United States into line with the many other countries that are making a systematic effort to utilize their long-neglected water power. This division also contributed toward a thorough investigation of water supplies for training camps, their drainage and sanitation, their protection from floods, and the springs available for army use in the desert regions.

In the Topographic Branch, though its force was severely drawn upon for oversea service, extensive work was carried on in military mapping. Camp sites were surveyed, aviation fields laid out, locations for munition plants selected, artillery ranges plotted, while motor. truck routes and airplane courses were mapped in many parts of the country. In addition to the regular topographic work, which in the fiscal year ended June 30, 1918, added 21,955 square miles to the area so surveyed, bringing the percentage of the total area of the country mapped to 42.2, special military mapping of regions selected by the War Department, mostly along the borders of the United States, covered 22,579 square miles.

To illustrate the war work carried on by the Survey detailed graphs are published in the report referred to. These diagrams reveal the fact that nearly every department of the government and many of the subordinate bureaus, boards, divisions, commissions, and administrations were served in some important capacity by the war-time activities of the Geological Survey.

Free-Air Data and the Cold Winter of 1917-18. The development of aviation for commercial purposes will inevitably lead to a more extended investigation of the meteorological conditions of the free air, as well as to the more detailed study of the data which are already available. Both meteorology and aviation will profit by this increasing emphasis upon what is, in many respects, the most important aspect of the science of the atmosphere, viz. that which concerns the conditions above the surface up to the highest flying levels and beyond. In eight *Supplements* to the *Monthly Weather Review* (Nos. 3, 5, 7, 8, 10, 11, 12, 13), the data obtained at the Drexel (Nebr.) Aerological Station, at Fort Omaha (Nebr.), and at the Ellendale (No. Dak.) Aerological Station have been published in full and discussed.

The two most recent *Supplements,* Nos. 12 and 13 (1918), contain the data obtained at Drexel and Ellendale from January to June, 1918, which are discussed by Willis R. Gregg; a description of the Ellendale station and notes on kite-flying by V. E. Jakl, and a study of the free-air temperatures during the cold winter of 1917-18 by Willis R. Gregg. The last-named discussion, while it rests upon incomplete data, brings out some facts of general meteorological interest. It is suggested that the cause of the remarkable temperature abnormalities that prevailed during the winter of 1917-18 is to be sought in the movements of the high- and low-pressure areas across the country and in the resulting location of the mean barometric maxima and minima. The pressure distribution in December, 1917, showed a continental anticyclone stretching from North Dakota southeastward to Illinois and a region of low pressure over the extreme Northwest. This pressure distribution favored low temperatures in the East and high temperatures over Western sections.

In January, 1918, also, the mean pressure distribution was similar, as were the temperature abnormalities. The pressure was, however, higher over Oregon and northern California, and this to some extent neutralized the influence of the high on the eastern slope of the Rocky Mountains. Hence the temperatures over the Northwest were not much above the average. In general, the southward movement of the lows during the winter drew in more cold air than usual from the north, and this resulted in large negative departures.

R. DeC. Ward

SOUTH AMERICA

The Petroleum Resources of South America. Though South America now ranks next to last among the petroleum-producing continents (John D. Northrop: Petroleum in 1916, *Mineral Resources of the United States for 1916,* Part 2, pp. 679-886, U. S. Geol. Survey, Washington, 1918) it seems likely that she will eventually occupy second or third place if the resources of her various fields fulfill present expectations. These deposits have been attracting much attention of late years, partly because of their latent possibilities, partly because, lying outside of the sphere of political domination of the great consuming nations, they afford a more independent source of supply.

Among the most comprehensive and authoritative discussions of the subject is a recent paper by F. G. Clapp entitled ''Review of Present Knowledge Regarding the Petroleum Resources of South America'' (*Bull. Amer. Inst. Mining Engineers,* No. 130, Oct. 1917, pp. 1739-1791). The author, writing from a wide acquaintance with the literature on the subject, a knowledge of the comparative geology of petroleum fields, and a practical familiarity with the problems of exploitation, presents a systematic treatment of the oil resources of the continent, productive and potential.

Five geological belts of oil-bearing rocks in South America are recognized. The first, the Caribbean, is in many respects a continuation of the Gulf Coastal Plain of North America and includes the areas being studied by petroleum companies in Colombia and northern Venezuela. Hon. Preston McGoodwin, in *Commerce Reports* for October 7, 1916, describes in detail the status of oil development in the latter republic at that date. For notes on the more recent developments in these countries see *Commerce Reports,* July 3, 1918, p. 36, and July 25, 1918, p. 329.

The second belt, lying between the Andes and the Pacific, corresponds to the similarly situated oil regions of North America. In this belt are located the already productive fields of Peru, at Zorritos, Lobitos, and Negritos. This is still the leading oil region of South America, having produced, in 1917, 2,533,417 barrels (see *U. S. Geol. Survey Press Bull. No. 382,* Sept. 1918). More than half of Peru's production comes from the Negritos pool.

The third belt is situated about the Orinoco delta, where asphalt lakes, supposed to indicate the presence of large underlying petroleum deposits, have been worked for many years, but where little oil development has as yet taken place.

The Andean district, the fourth in the series, extends along the eastern slope of the Cordillera, from Colombia to Patagonia. None of these fields are producing in exportable quantities, but several are considered of great promise, particularly that of the Santa Cruz region in eastern Bolivia.

The fifth belt, that of the South Atlantic coastal plain, contains the second field in South America which is actually producing on a commercial scale. Operations in this field are described in *Commerce Reports* for June 2, 1917. According to the *Geological Survey Press Bulletin* cited above, the production of petroleum in Argentina during the year 1917 was 1,144,737 barrels. All of this was yielded by the wells at Comodoro Rivadavia, other sources being negligible. The Argentine publication *Revista de Economía y Finanzas* (Sept. 5, 1918) estimates the total production for the year 1918 at 1,272,114 barrels (202,251 cubic meters), thus showing a substantial gain over 1917, of 127,377 barrels. This increase is due to the greater number of wells now in operation. All of the work done in this field is conducted by the Argentine government. (See also Fernando de Pedroso: Informe sobre el estado de la exploración y explotación de los yacimientos petrolíferos del distrito minero de Comodoro Rivadavia, *Direcc. Gen. de Minas, Geol. e Hidrol. Bol. No. 6, Serie A* (*Minas*), Minist. de Agric., Buenos Aires, 1915, and other publications by the same office.)

A large part of South American petroleum is of asphaltic or mixed bases, being particularly suitable for fuel oil. In view of the scarcity and high cost of wood and coal in many of the most densely settled sections of the continent this petroleum supply will probably become of great importance in furnishing fuel for ships, railways, and factories.

Reopening of the British Guiana Research Station of the New York Zoological Society. In his introduction to the volume "Tropical Wild Life in British Guiana" (see *Geogr. Rev.,* Vol. 6, 1918, p. 460) the late Colonel Roosevelt said: "The establishment of the Tropical Research Station in British Guiana by the New York Zoological Society marks the beginning of a wholly new type of biological work, capable of literally illimitable expansion. It provides for intensive study, in the open field, of the teeming animal life of the tropics."

Every member of the staff of this station has been serving in the American army during the war, and, now that hostilities have ceased, an expedition has started for British Guiana to resume scientific investigation. The financial support necessary for this undertaking has been provided by the New York Zoological Society through the generosity of five members of the Board of Managers, Col. Anthony R. Kuser, C. Ledward Blair, Andrew Carnegie, George J. Gould, and A. Barton Hepburn, and the requisite leave of absence has been granted to the staff in the service of the Society. On February 26 three of the staff sailed for the south: William Beebe, Director; Alfred Emerson, Research Assistant; and John Tee-Van, Artist and Preparateur. Their outfit included the most complete laboratory equipment ever taken to the tropics, and the station was reopened under most auspicious conditions at Katabo, its permanent headquarters. This is a most beautiful site, shaded with hundred-foot bamboos, at the very edge of the jungle, and directly at the junction of two great rivers, the Mazaruni and the Cuyuni. Here several bungalows and a large laboratory await occupancy, and here it is hoped that many of our scientific men may find a stimulating field for the prosecution of their particular lines of research.

While each member of the staff will undertake some special investigation, yet it is the intention of the Director that all shall unite in some definite ecological study of the interrelations of certain groups of organisms, in the hope of gaining some insight into more general problems of evolution, of adaptation, of survival. The results of all the studies will be published by the Zoological Society in the second volume of "Tropical Wild Life."

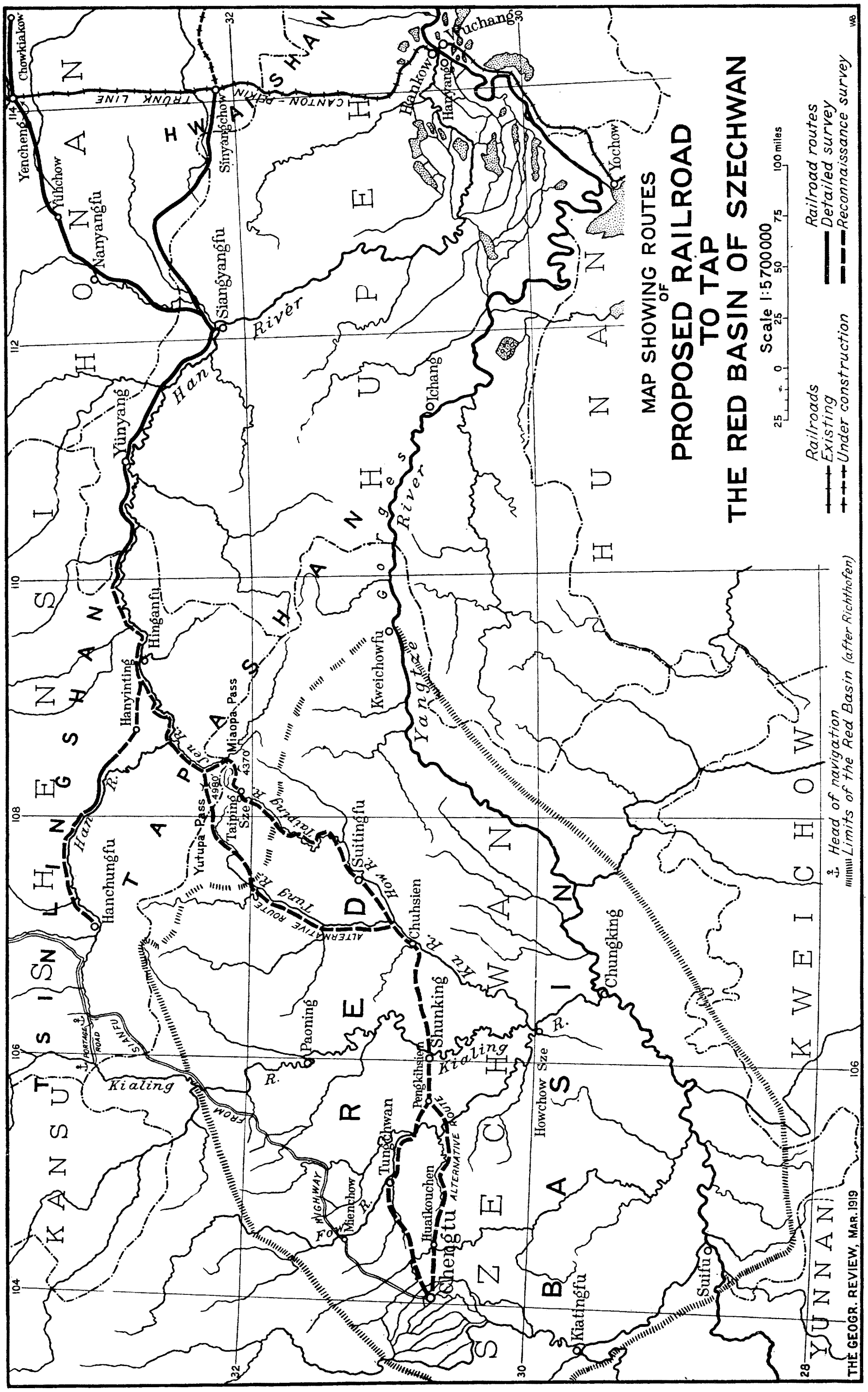

FIG. 1—Sketch map of west-central China showing the route of the proposed railroad to tap the Red Basin of Szechwan. Scale, 1:5,700,000.

Three years ago Colonel Theodore Roosevelt visited the station and wrote of its functions and activities. This year Professor Henry Fairfield Osborn, President of the Zoological Society and of the American Museum of Natural History, accompanied the expedition, spent several weeks in observing the unique conditions under which the undertaking is carried on, and advised as to its extension and future.

ASIA

A Proposed Railroad to Tap the Red Basin of Szechwan, China. Proverbial among the productive and populous regions of China is the Red Basin of Szechwan. On its area of 20,000 square miles is concentrated the major part of the vast province's 50,000,000 or 60,000,000 inhabitants. A maximum is reached in the Chengtu plain, where the gently sloping surface permits an intensive development of irrigation; here Richthofen (''Letters, 1870-1872,'' Shanghai, 2nd edit., 1903) estimated the density at 1,500 per square mile. But elsewhere, too, on the extremely accidented surface cultivation is carried to a high pitch by terracing. Rice, wheat, maize, and bean fields cover the slopes of 30°. Advantage is taken of differential erosion to cultivate parallel strips on slopes of 60°: indeed one may say there is cultivation ''where it is possible for a man to stand and work.'' Hemp, sugar, tobacco, and oranges are among the leading products of the country. The brine wells of the basin are famous; the red rocks are underlain by coal, and the existence of other minerals is known. Yet today the trade of the rich and populous province is small; it is largely confined to salt and such valuable commodities as silk and—formerly—opium. The customs returns from the treaty port of Chungking did not greatly exceed $20,000,000 in 1913 (*Dipl. and Cons. Repts. No. 5378,* London, 1914). Szechwan has no adequate outlet for its wealth.

Richthofen's Red Basin, a plateau of an average elevation of some 1,000 to 2,000 feet, is entirely rimmed by comparatively lofty mountain ranges. On the east the confused mountain mass of the Tapashan, 120 miles broad, separating Szechwan from Hupeh, is forced by the Yangtzekiang; the river, here flowing with strong current and broken by difficult rapids, forms the single gateway to the interior. Dangers of navigation put a toll on trade estimated at an annual loss of 20 per cent of the cargo. Until quite recently a favorable winter journey from Shanghai to Chungking took a month: against the summer floods it might be drawn out to three or four. In 1910, however, a regular steamship service was inaugurated with one vessel plying on the river during the summer months. Since 1914 the service has been extended to a fleet of ten vessels. Their success has been somewhat variable, and steam navigation on the upper Yangtze must still be regarded as in an experimental stage (see: La navigation du Yang-tseu entre Han-k'eou et le Sseu-tch'ouan, *Ann. de Géogr.*, Jan., 1918, p. 73; see also Report on Chungking, *China Maritime Customs Statist. Series Nos. 3 and 4 (Returns of Trade and Trade Repts.)*, 1916, Part 2, Vol. 2, pp. 421-426). Of land highways there are none. A railroad paralleling the Yangtze (Four Power Concession) has been projected, but its construction would be costly and difficult. More feasible is the Chinese Government Railroad plan of entering Szechwan from the north, from the Han River valley. Partial surveys have already been made for a road along this valley that will connect at Sinyangchow on the Pekin-Canton trunk road with the line now under construction from Nanking, with an alternative route connecting with the Pekin line farther north at Yencheng and originating some 36 miles to the east at Chowkiakow, its present eastern terminus. In the west the line leaves the Han River at Hinganfu and proceeds over the Tapashan to Chengtu. A branch has also been surveyed up the Han River from Hinganfu to Hanchungfu, where it reaches the two main routes by which the Red Basin has hitherto been accessible from the east and north: (1) the old historic highway from Sianfu, the capital of Shensi, to Chengtu and (2) the waterway up the Han to the head of navigation (a few miles below its source) across a land portage of 45 miles to the head of navigation on the Kialing and thence down this river to Paoning and Chungking. Various articles on the proposed line have appeared in the *Far Eastern Review* of Shanghai: the route from Chowkiakow to Hanchungfu was described in the February, 1917, number (pp. 321-332, with a railway map of China, 1:7,750,000 [marked 1:6,000,000 on original]) and the eastern section, from Chowkiakow to Siangyangfu, more in detail in the June, 1917, issue (pp. 492-494), while the whole line from Sinyangchow to Chengtu was discussed in the July, 1918, issue (pp. 249-263, with map, 1:5,000,000). The following notes and accompanying map are based on the unpublished reports of reconnaissances made in 1917 by two American engineers under the direction of the Chinese Government.

To enter the Red Basin from the northeast it is necessary to cross the broken, mountainous country of the Tapashan, rising to a general elevation of 6,000 feet and watered by numerous deep-cut streams draining respectively northeast and southwest. The direction and character of the stream valleys and the elevation of the passes are the factors here controlling railroad construction. Careful survey of the block of country between longitudes 108° and 110° E. and latitudes 31°50′ and 32°50′ N. has shown the existence of two passes of comparatively low elevation. From Hinganfu both are approached by the Jen River, the most practicable route leading out of the Han valley. The lower, Miaopa Pass, 4,370 feet, gives access to the Taiping valley; the Yutupá Pass, 4,980 feet, to the twin stream Tungkiang. The two rivers unite some distance above Chuhsien, from which point the projected railway will run in a nearly direct line to Chengtu via the main trail through a populous country. West of Chuhsien villages of 100 to 600 families, interspersed with smaller ones, appear every four or five miles, and on the main river crossings are such important centers as Shunking and Tungchwan. In the western portion an alternative route is under reconnaissance; it would, however, encroach on the Four Power Concession at Huaikouchen. The alternative routes via the Taiping and the Tungkiang valleys differ little in length. The former has the advantage by 15 miles and will require a shorter summit tunnel, but its summit gradients will be steeper (20 miles of 2 per cent gradient against 12 of 1.8 per cent, with possibilities of reduction to 1 per cent via the Yutupa Pass). Coal and iron are known along the Taiping, and the valley includes a few more large centers. Reconnaissance to the west has proved the restricted choice of routes, and not only does this apply to general direction; in detail the line that will be built must closely follow the winding course of the river selected. By the Yutupa Pass there will be a three-mile tunnel, and a three-thousand-foot bridge will be needed to cross the broad river at Shunking; but otherwise no special engineering difficulties are expected.

The line as thus designed will intercept the junk traffic of the chief rivers navigable in varying degree. For four months of the year the Han River is open to 10-ton junks to Hanchungfu, center of a plain rivaling that of Chengtu in fertility and wealth (see the excellent Commercial Report on Shensi Province, *Board of Trade Journ.*, Jan. 31, 1918). Tungchwan and Shunking are reached by 20-ton junks, and by construction of a branch line from the latter town to Chungking a good deal of the Yangtze traffic might be diverted. The branch line required would be 120 miles long and would pass through the important coal-mining center of Howchow Sze. With present transportation practically limited to junks and coolie carriers it is difficult to arrive at an estimate of probable railroad traffic. Of the productivity of the soil there is no question, and what is known of the mineral resources is encouraging. Coal outcrops at points along the Han, Jen, and Taiping Rivers and elsewhere in the Red Basin. At present it is only mined at such points where it can be worked from simple adits, but it is believed that the entire basin is underlain by coal-bearing rocks. Iron is found near Taiping Sze, asbestos near Hinganfu, copper and the precious metals west of Chengtu.

Probable traffic on the line after due time for establishment—at least one year—is thus estimated by the surveyors: freight crossing the Jen Ho summit going east, 20,000 tons per day; going west, 10,000 tons per day: passenger traffic, about 95 per cent third class, 1,500 people per day per mile each way.

POLAR REGIONS

A Proposed Polar Expedition by Airplane. Late in December of last year the plans were announced (e.g. *New York Times*, December 29, 1918) of a proposed polar expedition by airplane under the leadership of Captain Robert A. Bartlett, the well-known Arctic navigator, and with the support of the Aero Club of America. The plans call for the despatch of a vessel in June of this year to Etah, Greenland, which will serve as one of the main bases. From here a flying base is to be established at Cape Columbia, on the edge of the Polar Sea. Bases are also to be established at Cape Chelyuskin, Siberia, or on Nicholas II Land to the north of it, and at Wrangel Island. Within the triangle defined by these three points lies the greater part of the totally unexplored part of the Arctic. The expedition will be equipped with a large plane, capable, for instance, of making the flight of 1,133 miles from Cape Columbia to Cape Chelyuskin, and several scout planes for shorter flights from the bases, such as from Cape Columbia to the Pole, a distance of 413 miles. In addition it is planned to send a small oil-burning vessel into the Polar Sea from Bering Strait and force her northward far enough so as to avoid the westward coastal current which carried the *Karluk*, in the hope that she will drift across the Pole and emerge on the European side. The expedition is planned to take three years.

GEOGRAPHICAL NEWS

Personal

Mr. C. E. Akeley of the American Museum of Natural History addressed the Aeronautical Society of America on November 26, 1918, in New York City, on ''Exploration in British East Africa.'' Mr. Akeley dwelt upon the part that the airplane will play in the future work of exploration in this region.

Dr. J. G. Bartholomew, head of the well-known Edinburgh cartographic institution of that name, was awarded the Helen Culver Gold Medal by the Geographic Society of Chicago last November.

Professor G. G. Chisholm of the University of Edinburgh was awarded the Helen Culver Gold Medal by the Geographic Society of Chicago last November.

Dr. J. J. Galloway read a paper on February 17 before the New York Academy of Sciences entitled ''Notes on the Geology and Physiography of Yucatan, Mexico.''

Professor C. L. Poor of Columbia University addressed the New York Academy of Sciences on December 2, 1918, on ''Recent Advances in the Art of Navigation.'' Modern methods of finding one's position at sea and in the air were explained, and the new ''line of position computer'' and other instruments were exhibited.

M. Jules Rouch has been awarded the Victor Raulin prize of the Paris Academy of Sciences for his work in meteorology, atmospheric electricity, and physical oceanography.

Professor Frederick Starr of the Department of Anthropology in the University of Chicago addressed the Geographic Society of Chicago on January 10 on ''The Mountain Monasteries of Korea.''

Professor Bailey Willis of Leland Stanford Junior University addressed the Psysiographers Club of Columbia University on November 22, 1918, on ''South America, Its Countries, Its People, Its Industries, and Its Relation with the United States.''